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HOW TO USE **VISICALC[®]** **SUPERCALC[®]**

Utilize Your System's Full Potential
With This Step-by-Step Instruction Guide

An Alfred Handy Guide



By Carlton Shrum

HOW TO USE VISICALC/ SUPERCALC

by Carlton Shrum

AN ALFRED HANDY GUIDE

Computer Series Editor:
George Ledin Jr.

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1. INTRODUCTION

USING PERSONAL COMPUTERS FOR BUSINESS APPLICATIONS

As personal computers become more powerful and less expensive, they are being purchased more often for business applications. Small businesses which at one time could not afford a computer now find that a personal computer is a very practical investment that they really cannot afford to be without. Larger businesses which at one time would not have considered anything smaller than a mini-computer now find that many personal computers can perform the same tasks as mini's at a much lower cost.

A primary use of these personal computers is numerical applications. Businesses are concerned about financial planning: budgets, financial reports, analyses for developing and marketing new products, and an endless number of other questions and applications. All of them can be handled with an electronic spreadsheet program such as VisiCalc or SuperCalc.

Personal computers have also become a cost-effective tool for engineers and teachers, and are increasingly used in the home. Engineers have projects to schedule, work hours to allocate, and equations to develop and evaluate. Teachers have test scores to accumulate and grades to assign. And at home, most anyone has personal finances to keep track of. These applications also are appropriate for electronic spreadsheet programs.

WHAT ARE ELECTRONIC SPREADSHEET PROGRAMS?

Electronic spreadsheet programs (also called financial planning software or spreadsheet simulation programs) allow you to create a spreadsheet, worksheet, gridsheet, or any other table of information, using the memory of the computer as the pencil and paper. The video display of the computer or terminal acts as a window through which you view the information you enter. You can enter *textual information* (such as headings), *numerical values*, and *formulas* into the spreadsheet. Figure 1 illustrates these three different types of entries.

Columns		
A		B
Rows	19 Office	
	20 Rent:	800
	21 Furniture:	200
	22 Telephone:	300
	23 Utilities:	100
	24 Total Office:	SUM(B20:B23)

FIGURE 1. Sample portion of a spreadsheet.

As you can see, textual information was entered into column/row A19, A20, A21, A22, A23, and A24. Numerical values were entered into B20, B21, B22, and B23. The formula entered into B24 adds the column.

The computer also acts as eraser and calculator. You can quickly and easily make any number of alterations to the data within the table. The computer will evaluate any formula using the data you have entered. It retains the formula and displays the resulting value. For example, the formula in Figure 1 would be retained for future data alterations, but "1400.00" would be displayed in B24 after the computer calculates the formula. With the computer controlling the entry of data, providing a comprehensive memory, and performing arithmetic, the preparation of a spreadsheet is faster and more accurate than if it were prepared by hand.

Beyond this automated preparation, the electronic spreadsheet programs provide commands to perform tasks that would barely (if at all) be feasible if developing the spreadsheet by hand.

1. Commands such as PRINT, SAVE, LOAD, MOVE, COPY, REPLICATE, and GOTO may be executed with immediate results.
2. Any number of copies of the spreadsheet (either whole or partial) can be printed out.
3. The developed spreadsheet can be saved on a diskette; a previously saved spreadsheet can be loaded into the computer from diskette; information in the spreadsheet can be moved, copied, and manipulated in any number of ways within the computer memory; and any location in the spreadsheet can be accessed immediately.
4. "What if?" questions concerning the information can be asked, and answered, quickly and easily.
5. If a change is made to a numerical entry, all formulas that use that value are automatically recalculated.

As you can see, although the electronic spreadsheet programs are simple, they are very powerful.

VISICALC AND SUPERCALC— NOTEWORTHY EXAMPLES

The first of these programs to appear for personal computers was VisiCalc, created by Software Arts, Inc., and marketed by VisiCorp. When it became available a few years ago, it was often described as reason enough to purchase a personal computer. In fact, its availability may have sold more Apple II computers than the computer's game playing ability. More copies of VisiCalc have been sold than of any other program for small computers.

SuperCalc, created by Sorcim Corporation, was developed after VisiCalc and particularly for those computers that could not run the original version of

VisiCalc. At the present time, it is the second most popular electronic spreadsheet program for personal computers. Because it and VisiCalc are the most popular electronic spreadsheet programs, we have focused on them in this Handy Guide. This is not to imply that they are the best programs available, and much of what is said about them pertains to other programs.

VisiCalc and SuperCalc both use an interactive location-oriented approach to develop spreadsheets. The program provides the user with a matrix of rows and columns; a cursor is moved to the desired location within the matrix, and a value or formula is entered exactly as wanted. Each entry is placed in the spreadsheet immediately and may be viewed with respect to the rest of the matrix. The screen (or video display) of the computer or terminal acts as a window for viewing the matrix.

OTHER POPULAR ELECTRONIC SPREADSHEET PROGRAMS

There are several other spreadsheet programs (see Appendix B at the end of this Handy Guide). Many use the same approach to spreadsheet development as VisiCalc and SuperCalc, but some use another approach, one that allows the user to enter all the desired information in a separate batch environment and then generate the spreadsheet as output to the video display or to a printer. If changes must be made, the user returns to the batch list of entries, makes the changes, and then regenerates the spreadsheet. Since this Handy Guide will concentrate on location-oriented programs such as VisiCalc and SuperCalc, the discussion concerning data entry, editing, and other interactive operations may not be applicable to programs using the batch-oriented approach. However, the discussion of the commands and capabilities of electronic spreadsheet programs is applicable to almost all the available programs.

2. THE SPREADSHEET ON THE SCREEN

THE COMPLETE SPREADSHEET

The spreadsheet, or matrix of columns and rows, provided by an electronic spreadsheet program can be quite large. VisiCalc and SuperCalc provide up to 254 rows by 63 columns of information.

Though some spreadsheet programs designate both columns and rows with numbers, the programs being considered here use letters for the columns and numbers for the rows. The columns are designated A through Z, then AA through AZ, and finally BA through BK (for a total of 63). The rows are designated simply 1 through 254.

The spreadsheet is much too large to view in its entirety; therefore the programs allow you to view a portion of it at a time (a screenfull). You can move the window provided by the video display to the left or right or up or down through the spreadsheet to view any part of it (see Figure 2).

THE DISPLAYED PORTION

The programs display on the screen of the terminal or computer a section of the spreadsheet along with the corresponding column letters and row numbers. The point of intersection of a column and a row is known as a *cell*; information is entered into these cells. To specify a cell, you first give its column letter(s) and then its row number. For example, A1 is the first cell and BK254 is the last cell in VisiCalc and SuperCalc.

A large *cursor* (an underline in SuperCalc, a reverse video block in VisiCalc) denotes the *active cell*, the location into which you may enter information at the moment. To scroll up or down or left or right through the spreadsheet, you move the cursor. This may be done with the arrow keys found on many terminals and computers or the control key (sometimes abbreviated CTRL or CNTR) used in conjunction with the *s*, *e*, *d*, and *x* keys. The control key is held down while you press one of the letter keys: pressing the *s* is equivalent to hitting a left-arrow key; the *e* is equivalent to an up-arrow key; *d* is right; and *x* is down.

OTHER INFORMATION BEING DISPLAYED

All of these programs display other useful information on the screen; the details depend on the program. They all include information about the active cell and its contents, general spreadsheet information, and a location for entering data. Some programs even have a summary of the available commands.

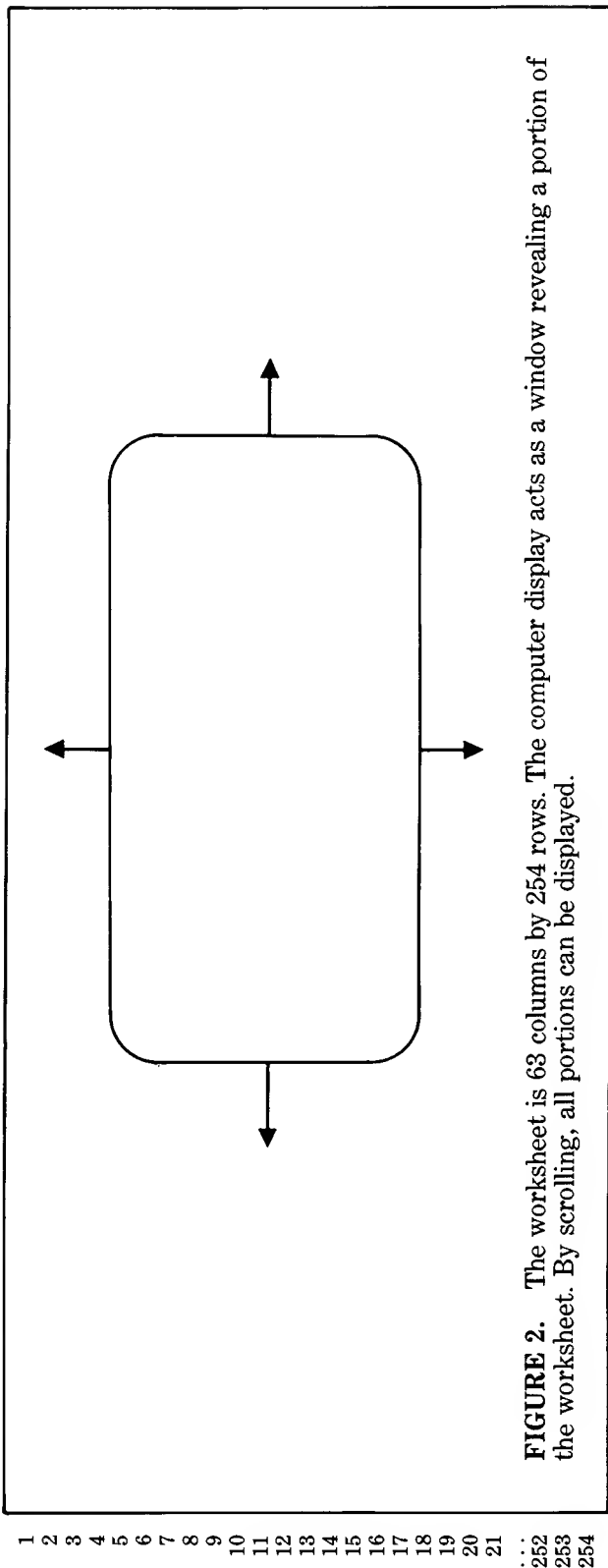
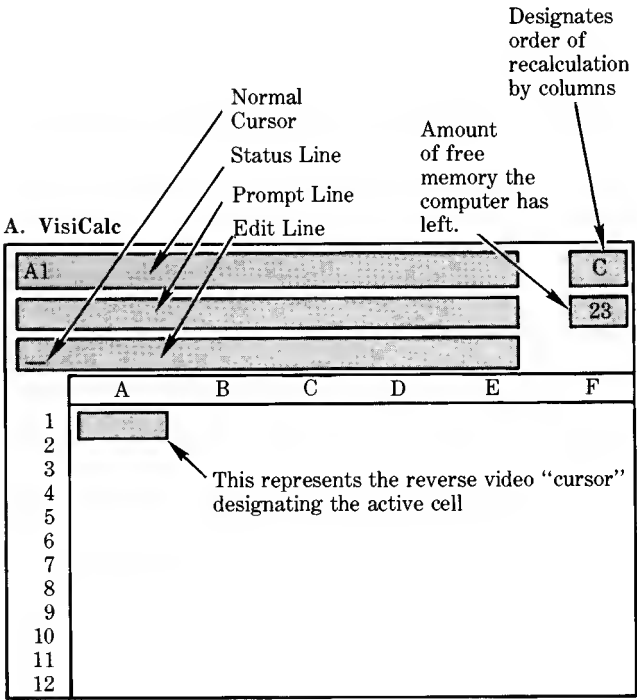


FIGURE 2. The worksheet is 63 columns by 254 rows. The computer display acts as a window revealing a portion of the worksheet. By scrolling, all portions can be displayed.

VisiCalc and SuperCalc each provide three lines of information which are typical of the type of information generally displayed (see Figure 3A and B). In the first of the three, called the *entry contents* or



B. SuperCalc

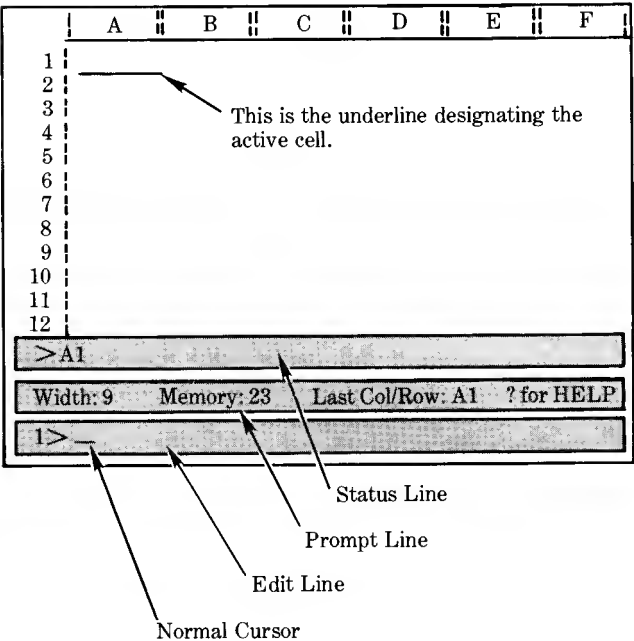


FIGURE 3. A) A blank VisiCalc display. The status prompt, and edit lines are in the upper-left corner. Additional information is in the upper-right corner. (See p. 31 for an explanation of recalculation.) B) A blank SuperCalc display. The status, prompt, and edit lines are on the bottom. (The prompt line displays other information except when a prompt appears.)

status line, the column and row of the active cell, as well as its contents and other pertinent information, are displayed. The second line is a *prompt line*, which either supplies general information or is used to prompt you for more information when entering a command. The third line is the *entry* or *edit line*, in which you see the usual cursor which you expect to see on the screen. Commands or data are first typed onto this line before being entered. When you hit the RETURN (or ENTER or END-OF-LINE) key, the computer will place the data into the active cell. (If a command is entered, it will be executed or will prompt you for additional information in the prompt line). Note that data is transferred from the edit line to the active cell only after the RETURN key is hit, not during entry.

3. A SAMPLE SPREADSHEET

Consider the following situation. We want to start a small software house. We have been developing a business program for which there is a need and have decided to market it ourselves. In setting up the new business, several expenses have to be taken into account. A programmer and a secretary must be hired, an office with suitable equipment and furnishings is needed, we must advertise the new program, and supplies are needed for creating the final product. Let us develop a spreadsheet for estimating these expenses and comparing them with income for the first year of the business.

Look at Figure 4 (pp. 12-13) Super Software House. This is a simplified but realistic view of what a person starting a business would have to take into account. Notice all calculations have been made and final numbers are displayed on the spreadsheet. Before we explain the process for entering and adjusting these numbers, let's examine the model the spreadsheet is based on and the formulas used to arrive at the final result.

GENERAL COMMENTS

This spreadsheet shows the business concentrating on the production of one program. The first two months are development months (thus, there are no sales). The effort does not end there, however. With any new program, there will be bugs or oversights to be corrected, users' suggestions to incorporate, and planned updates and improvements to be performed. Also, a program is initially written for use on only one type of computer. The original program will need to be converted to provide versions for use on other machines. This process of maintenance and support requires continued focus on the one program. A larger company probably would be working on several programs, introducing three or more during the year. This small company is putting its efforts into its first program in order to become well established.

LABOR EXPENSES

Under the Labor section, data is entered into the Hours/Month and Wages/Hour cells, and formulas placed into the Overhead and Total Labor cells calculate those values. Labor Overhead consists of medical benefits, insurance, unemployment, and other miscellaneous costs connected with employees. The formula used to calculate this expense is $.25 \times (\text{Programmer's Hours/Month} \times \text{Wages/Hour} + \text{Secretary's Hours/Month} \times \text{Wages/Hour})$. Total Labor is simply total programmer's and secretary's wages plus Overhead.

Notice that "What if?" questions can be handled by varying either the Hours/Month worked or Wages/Hour and letting the computer recalculate the Total Labor expenses. Making the number of work hours the same for each month is somewhat simplistic, since the workload may go up and down, or a person may need time off. Such potential occurrences could easily

be analyzed by altering the appropriate cells in rows 6 and 9.

EQUIPMENT EXPENSES

These expenses refer mainly to computer equipment. At least one computer will be required at the start, along with various peripheral devices. A typewriter or a word-processing package (for the computer) will also be necessary. In order to convert a program for use on several versions of computers, access to those computers is required. The access could be gotten by leasing the computers themselves, or by purchasing computer time on computers at another location. The expenses listed take into account these various costs as well as maintenance contracts. Equipment expenses have been kept constant for the year in the present spreadsheet, but in reality they might well start off lower and go up as time and work progressed.

ADVERTISING EXPENSES

Advertising includes regular ads to be placed in computer magazines (Media) as well as large Direct Mail campaigns. Mailing lists of names and addresses of computer stores, owners of specified brands of computers, and other software markets can be purchased, and a mass mailing campaign publicizing the new program can be launched. In the current spreadsheet, one large and two smaller campaigns are carried out during the first year.

MAILING, POSTG EXPENSES

These expenses consist of such items as normal business mail, answers to product inquiries, and rental of a postage meter machine. The numbers entered were increased as the year goes by, reflecting the anticipated rise in product inquiries and answers to users' questions.

OFFICE EXPENSES

This category consists of the expenses, excluding equipment, necessary to keep an office functioning. It is assumed that furniture will be rented rather than bought. Rent and furniture expenses will probably remain constant for the year, but telephone and utilities may rise or fall from month to month. The values in the spreadsheet for the latter two are projected averages, but the entries could easily be changed to reflect potential fluctuation.

COSTS/UNIT

These costs are the non-labor expenses involved in producing one copy of the program to be sold. Materials include a floppy diskette or cassette tape and labels, packaging includes the box or envelope in which to mail the unit, and Other includes documentation, postage, and so on.

[illegible]

Total Cts/Unit is a formula that adds the above costs. It is assumed that production will match Units Sold for each month and that unit costs will drop by 10% when the monthly production reaches 500 units. This represents an increase in efficiency and a discounted price for materials and packaging. The formula, then, will have to take this into consideration, and with VisiCalc and SuperCalc this is possible. Note that Total Cts/Unit does in fact decrease by 10% in months 11 and 12, when sales reach 500 units per month.

TOTAL EXPENSES

This row consists of a formula that multiplies Total Cts/Unit by # of Units Sold and adds this to the sum of all the entries detailed above. Overall, the view of expenses is simplistic. The business pictured is small and just starting, the total does not include such expenses as taxes, and most of the values are kept constant for the year. However, the costs presented should give a fairly clear picture of how a spreadsheet program could be used to project, as well as to keep track of, business expenses.

INCOME

The first entry here is a target % of Profit. (For convenience, we used "50" instead of ".50," so all formulas using this entry will be divided by 100.) Any desirable profit percentage could be entered here.

The next entry, Proj'd Sls/Yr, is an estimated annual unit sales projection. Unit Price contains the following formula: $\text{The sum of all monthly Total Expenses} \div \text{Proj'd Sls/Yr} \div (1 - \% \text{ Profit} \div 100)$. This is equivalent to the unit price necessary to break even in the first year (assuming the Proj'd Sls/Yr is accurate) plus achieve the targeted percentage of profit. Thus, to achieve a 50% profit on unit sales of 3,000, we will have to sell each unit for \$112.74.

By varying the entries for % Profit and Proj'd Sls/Yr a variety of "What if?" questions can be answered. We must be careful, however, to change the monthly # Units Sold to total to any new entry for Proj'd Sls/Yr, since Total Expenses will vary with # Units Sold. For example, if we sell 5,000 units, (1,000 more in Month 11 and 1,000 more in Month 12), then our total expenses for the year will increase from \$170,006.50 to \$197,006.50. To make a 50% profit, unit price will have to be \$78.80.

The number of Units Sold starts at zero since the product is in development. The figures for months 3 through 12 are chosen to represent a slow beginning and month-to-month fluctuation, but also an anticipated overall growth, adding up to the projected 3000 copies for the year. Given the projected total sales, the month-to-month # of Units Sold could be varied to show what would happen if the overall projection is low or high.

The row labelled Contract Work includes income from consulting and contracts for producing specific programs — income not directly related to the specific program being marketed. This value varies throughout the year as one contract is completed and another is acquired.

Total Income is the income from the contract work plus the product of the # of Units Sold multiplied by the Unit Price.

NET INCOME

The Net Income is simply the Total Income minus the Total Expenses. This row gives a value for each month, but another entry showing the sum of all entries in row 40 might be useful. Also, a column N with totals for all row items would be useful for viewing the year's expenses and income.

4. ENTERING INFORMATION

Now that we understand the basic assumptions underlying our example, we are ready to create the spreadsheet.

ENTERING A TITLE

When entering a spreadsheet program, a blank spreadsheet is provided. We can enter the title for the spreadsheet in any location we choose. A convenient place is where the active cell cursor sits initially—column A, row 1. The title of our spreadsheet will be SUPER SOFTWARE HOUSE. When the entry of the text on the edit line is complete, hitting the return key sends it to the active cell. At the start of entering a spreadsheet, each column has a default number of characters (say, 9) that may be displayed (known as the column width). In some spreadsheet programs, if there are no entries to the right of the active column, the programs will display the entire contents of the cell across the adjacent columns (in this case, B and C) as shown below.

```
  I   A   II  B   II  C   II  D   I
1 | SUPER SOFTWARE HOUSE
```

If the cell to the right contains an entry, then only the single spreadsheet column (with its default width) will be available for display; this is also true for programs that do not use the adjacent columns. In all cases, the entire contents of a cell is kept in memory and will appear on the status line when that cell becomes the active cell.

ENTERING OTHER INFORMATION

Next we can enter the necessary row and column headings and some numerical values. Using the arrow keys, we move the active cell cursor to cell B2. We want to enter the heading Month 1 into that location. When we have entered it on the edit line and hit the return key, the characters are placed into the cell. Now we can move the cursor to cell C2 and enter the heading Month 2. In a similar manner, the other column headings, Month 3 through Month 12, can be entered into cells D2 through M2. Moving the cursor back to column A, we enter the row headings into cells A3 through A40.

Upon completion, we have the spreadsheet shown in Figure 5 (pp. 18-19). Figure 5 contains the complete spreadsheet, not just what would appear in the window. Remember, the window provided by the screen of the computer or terminal is of a limited size. If figures 4 through 10 were copies of the information visible in the window as found on, say, an 80-character display with SuperCalc, only 8 columns (when each column is 9 characters wide) and 20 rows would be shown. However, the PRINT or OUTPUT command of the spreadsheet program will send the entire spreadsheet to a printer.

We are now ready to enter the initial numerical values into the Month 1 column, column B. The cells in rows 6-7, 9-10, 13, 15-16, 18, 20-23, 26-28, 33-34, and 36-37 require initial values. These cells will contain values for hours, wages, other expenses, and income. The remaining column-B cells will be left blank or will contain formulas, depending on the above values. As the numerical values are entered, an automatic feature of the spreadsheet programs becomes apparent. The programs *left-justify* text but *right-justify* numerical values, just as you would do if writing them in a list. Other than justification, the values entered are not formatted. In general, numerical values are displayed just as they are entered. This gives us the spreadsheet shown in Figure 6 (pp. 20-21).

ALTERING CELL CHARACTERISTICS

JUSTIFICATION

Suppose we are not satisfied with the default formatting of the cells. For instance, left-justification of text is usually fine, but it might look better if the column headings in B2 through M2 were right-justified to correspond to the right-justification of the numerical values. Whenever a change of cell format is desired, the **FORMAT** command can be used to alter justification within a cell or within a group of cells. This is accomplished for both VisiCalc and SuperCalc by entering "/" and then "F" and then following the instructions on the prompt line.

COLUMN WIDTH

Notice that after the values have been entered into column B, some of the headings in column A have been truncated and are rather difficult to understand. Available as a Format option is the ability to change the width of columns. In SuperCalc, each individual column may be given its own width. In VisiCalc, all columns must be given the same width. In either case, when a column is changed in width, a different number of characters are displayed on the screen for that column (but the contents in memory remain as originally entered). Also, the number of columns displayed on the screen (i.e., in the window) possibly will be altered. The screen's set width (e.g., 80 columns or 64 columns) means that it can display only that many characters. If all columns are 9 characters in width, then, after sufficient room has been subtracted for the row numbers at the left of the screen (say, 5 characters), there is room for 8 columns to be displayed on a screen with a width of 80 characters. If each column is 24 characters wide, then only 3 columns can be displayed. If each column is 20 characters wide, still only 3 columns can be displayed, though there will be a lot of wasted columns. Thus, there are trade-offs when using wide columns.

It should be noted that if a column with numerical entries is narrower than the values, the values are not truncated for display as are textual entries. They are rounded or changed into scientific notation as

	I	A	I	B	I	I	C	I	D	I	E	I	F	I	G	I	H	I	I	I	J	I	K	I	L	I	M	I																																																																																																																																												
1	SUPER SOFTWARE HOUSE																																																																																																																																																																							
2	Month 1														Month 2														Month 3														Month 4														Month 5														Month 6														Month 7														Month 8														Month 9														Month 10														Month 11														Month 12													
3	EXPENSES																																																																																																																																																																							
4	Labor																																																																																																																																																																							
5	Programmers																																																																																																																																																																							
6	Hours/Month:																																																																																																																																																																							
7	Wages/Hour:																																																																																																																																																																							
8	Secretary																																																																																																																																																																							
9	Hours/Month:																																																																																																																																																																							
10	Wages/Hour:																																																																																																																																																																							
11	Overhead:																																																																																																																																																																							
12	Total Labor:																																																																																																																																																																							
13	Equipment:																																																																																																																																																																							
14	Advertising:																																																																																																																																																																							
15	Media:																																																																																																																																																																							
16	Direct Mail:																																																																																																																																																																							
17	Total Advtsg:																																																																																																																																																																							
18	Mailing, Postg:																																																																																																																																																																							

```

19| Office
20| Rent:
21| Furniture:
22| Telephone:
23| Utilities:
24| Total Office:
25| Costs/Unit
26| Materials:
27| Packaging:
28| Other:
29| Total Cts/Unit:
30| Total Expenses:
31|
32| INCOME
33| % Profit:
34| Proj'd Sls/Yr:
35| Unit Price:
36| # Units Sold:
37| Contract Work:
38| Total Income:
39|
40| NET INCOME:

```

FIGURE 5. Spreadsheet with headings entered.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	SUPER SOFTWARE HOUSE												
2	Month 1 Month 2 Month 3 Month 4 Month 5 Month 6 Month 7 Month 8 Month 9 Month 10 Month 11 Month 12												
3	EXPENSES												
4	Labor												
5	Programmers												
6	Hours/ 176												
7	Wages/ 15												
8	Secretary												
9	Hours/ 176												
10	Wages/ 7.5												
11	Overhead:												
12	Total Labor: 2000												
13	Equipment												
14	Advertising:												
15	Media: 1000												
16	Direct 0												
17	Total Advertising: 200												
18	Mailing, 200												

19 Office	
20 Rent:	800
21 Furnitu	200
22 Telepho	300
23 Utiliti	100
24 Total Office:	
25 Costs/Unit	
26 Materia	5
27 Packagi	5
28 Other:	5
29 Total Cts/Unit:	
30 Total Expenses:	
31	
32 INCOME	
33 % Profit	50
34 Proj'd \$	3000
35 Unit Price:	
36 # Units	0
37 Contract	1500
38 Total Income:	
39	
40 NET INCOME:	

FIGURE 6. Spreadsheet with first month initial data entered. (Notice that Column A headings are truncated and entered data is flush right.)

necessary for display. As with text, the original entries are saved unchanged in memory. In the example, column A will be given an individual column-width adjustment of 15 characters, sufficient to display all of the headings; this change results in only 7 columns of information being visible in the window (this will not be reflected in the Figures, because they show the entire spreadsheet, except where otherwise noted). If you are using VisiCalc, you might not wish to widen all columns just to make room for the row headings. In that case you can revise the spreadsheet by beginning the 1st month in column C.

THE DOLLARS-AND-CENTS OPTION

Another useful Format option is the \$ option. Use of this option places numerical values into a dollars-and-cents format (though a dollar-sign is not inserted). If this format is requested, then the numerical values being displayed in the formatted cells will show a decimal point with two digits to the right of it, whether or not the digits were there previously. If there are *more* than two digits to the right of the decimal point, the number is rounded to two: for example, 99.999 becomes 100.00. Note that the column must be wide enough to hold the values in this format, or else they will not be displayed at all (instead, special not-enough-room characters such as >>>> will be displayed).

Let us choose the \$ option for the spreadsheet now being entered. Figure 7 (pp. 24-25) shows the spreadsheet after these Format changes have been made.

FORMULAS

NUMERICAL EXPRESSIONS

In addition to text or simple numerical values, formulas can be entered into the spreadsheet cells. The simplest kind of formula is a numerical expression, simple arithmetic such as you would evaluate on paper or perform on a calculator. For instance, if $(128 + 565) * 78$ is entered into a cell, the program will immediately calculate the result and display that result, 54054, on the spreadsheet (while retaining the original formula, $(128 + 565) * 78$ in memory and showing it on the status line).

All the standard arithmetic operators are available. Addition and subtraction use the standard operators, but some of the other operators may be unfamiliar: multiplication is $*$; division is $/$, and raising to a power is $^$.

The standard operator order of evaluation, or *precedence*, also holds. That is, of the five standard numeric operators, $+$, $-$, $*$, $/$, and $^$, $^$ has the highest priority, $*$ and $/$ come next, and $+$ and $-$ have the lowest priority. Any expression within parentheses is evaluated before those outside of parentheses. For example, in the expression $4 - (3 * 5)^2 + 10$, the $(3 * 5)$ will be calculated first because of the parentheses, the resulting product will be taken to the power of 2, that result will be subtracted from 4, and finally,

the 10 will be added. Note that the subtraction and the addition are of equal precedence, and therefore the leftmost operation is performed first.

CELL NAMES AS VARIABLES

An especially useful feature of formulas is that they may contain cell names as variables. For instance, $(B6*B7 + B9*B10)*.25$ can be entered into a cell, and then the program will find the values for each of the four cells named, perform the arithmetic with those values, and display the result (again, the original formula will be retained in memory).

In our example, we want to enter formulas into cells B11, B12, B17, B30, B38, and B40. (See Figure 8 on page 28 for all of the formulas used in our example.) The first formula, for B11, is the one given above. It multiplies the programmer's hours/month by the wages/hour, the secretaries' hours/month by the wages/hour, adds the products, and then multiplies the total by 0.25, to determine the 25 percent labor Overhead (medical insurance, unemployment, and so on). The formula for B12, Total Labor Costs, is $B6*B7 + B9*B10 + B11$. This calculates the combined programmer and secretary wages and adds them to the overhead. The formula for B17, which gives us Total Advertising, is $B15 + B16$, the sum of the Media cost and the Direct Mail cost.

Working our way down, let's skip for a moment Total Office expenses and Total Costs/Unit and go to B30, Total Expenses. This consists of the sum of all the fixed expenses: B12, B13, B17, B18, and B24; and the Total Costs per Unit, B29, multiplied by the actual number of Units Sold (B36). The resulting formula is: $B12 + B13 + B17 + B18 + B24 + B29 * B36$. (Note that B29 will be multiplied by B36 before any addition is done.)

Skipping Unit Price, Total Income, B38, is equal to the Unit Price, B35, multiplied by the Units Sold, B36, and added to the Contract Work, B37. The formula is: $B35 * B36 + B37$. Finally, Net Income, B40, equals the Total Income minus the Total Expenses: $B38 - B30$.

FUNCTIONS

The spreadsheet programs also provide several built-in mathematical and special functions. A *function* is a portion of the spreadsheet program that performs preset operations and can be called upon within a formula. Calling a function consists of including within the formula the function name along with one or more numerical values, variables, or expressions (known as *parameters*).

The mathematical functions are similar to those found on scientific calculators and may include absolute value (ABS), integer portion (INT), square root (SQRT), SIN, COS, TAN, LOG10 (log to base 10), LN (log to base e), EXP (e to a given power), and others. Each of these functions expects one parameter, such as INT(B10+.5), SIN(30), or SQRT(ABS(B7)).

	A	B	C	D	E	F	G	H	I	J	K	L	M	T
1	SUPER SOFTWARE HOUSE													
2	Month 1 Month 2 Month 3 Month 4 Month 5 Month 6 Month 7 Month 8 Month 9 Month 10 Month 11 Month 12													
3	EXPENSES													
4	Labor													
5	Programmers													
6	Hours/Month: 176.00													
7	Wages/Hour: 15.00													
8	Secretary													
9	Hours/Month: 176.00													
10	Wages/Hour: 7.50													
11	Overhead:													
12	Total Labor: 2000.00													
13	Equipment:													
14	Advertising:													
15	Media: 1000.00													
16	Direct Mail: .00													
17	Total Adverts: 9													
18	Mailing, Postg: 200.00													

19 Office	
20 Rent:	800.00
21 Furniture:	200.00
22 Telephone:	300.00
23 Utilities:	100.00
24 Total Office:	
25 Costs/Unit	
26 Materials:	5.00
27 Packaging:	5.00
28 Other:	5.00
29 Total Cts/Unit:	
30 Total Expenses:	
31	
32 INCOME	
33 % Profit:	50.00
34 Proj'd \$ls/Yr:	3000.00
35 Unit Price:	
36 # Units Sold:	.00
37 Contract Work:	1500.00
38 Total Income:	
39	
40 NET INCOME:	

FIGURE 7. Spreadsheet with Column A width adjusted, month headings right-justified, and numerical data in dollar-and-cents format.

The special functions provide features far beyond those of a standard calculator. They accept a set or sequence of parameters and therefore replace several individual calculations. They may include the sum of a set of values (SUM), the average of a set of values (AVERAGE), the minimum of a set of values (MIN), the maximum of a set of values (MAX), the count of the number of non-blank entries in a list of cells (COUNT), and others. Examples are AVERAGE(50,.5*C13,D20) and MAX(D20,E20,G20).

When indicating a set of variables as parameters, a cell range can be specified, using a colon. For instance, SUM(B20:B23) will sum the values found in the four cells B20, B21, B22, and B23. This last formula will be entered into cell B24 and represents the Total Office expenses. The formula for cell B35, Unit Price, also makes use of the SUM function, but is more complicated. That formula is (SUM(B30:M30)/B34)/(1 - B33/100), where the expenses for the entire year (the sum) are being divided by the number of items expected to be sold during the year, and that result is divided by 1 minus the targeted profit percentage.

The most interesting (and complicated) formula being placed into column B is that for cell B29. It contains a useful special function, the IF function. The form of that function is IF(p1,p2,p3), where p1 is a logical expression and p2 and p3 are numerical values or other formulas (yes, they could be other IF functions). A *logical expression* is an expression that contains a logical operator—an operator that asks a true-or-false question. The operators are = (equals), < (less than), > (greater than), <= (less than or equal to), >= (greater than or equal to), and <> (not equal to). For example, 500>200 is true, because 500 is indeed greater than 200; 250 <= 300 + 16 is also true, because 250 is less than 316. Another example, B36<500, cannot be evaluated until the value for B36 is obtained.

In the IF function, if the logical expression p1 is true, then the value of p2 is chosen as the value for the IF; if p1 is false, the value of p3 is chosen. For example, given the formula IF(45<54,2,3), the value of the formula will be 2, since 45 is less than 54.

The formula for B29 is (SUM(B26:B28))*(IF(B36<500,1,.9)): the sum of B26 through B28 is multiplied by 1 if B36 is less than 500 and by 0.9 otherwise. This value is the per-unit cost for producing one copy of the finished program (not including labor). The IF represents the fact that when production goes up to 500 or more units per month, the per-unit cost drops 10 percent.

FORMULAS AND INITIAL VALUES

The numerical values entered into column B represent the initial expenses of Super Software House. The remaining columns (C through M) depend on those initial values. Therefore, all entries in the remaining columns will be formulas. The initial values for all expenses except Direct Mail and Mailing/Postage are assumed to be constant for the twelve-month period, and those two items happen to have the same

projected values for Month 2 as for Month 1. Therefore, the numerical entries in rows 1 through 30 for column C will reflect the initial values in column B. The projected values for the Income items will also be the same for column C as for column B.

Therefore, for each of the cells in column B containing numerical values, the cell name will be placed into the cell in the same row in column C. That is, C6 will be given the entry B6, C7 will be given B7, C9 will be given B9, and so on. For each cell in column B that contains a formula, the same formula will be placed into the corresponding row in column C, except that it will be altered to draw its information from column-C cells rather than column-B cells. For example, since cell B24 contains SUM(B20:B23), cell C24 will be given the formula SUM(C20:C23). One exception to the rule will be the formula in B35. The SUM within that formula is the expenses of the entire year; therefore it must remain B30:M30 and should not be changed to C30:M30.

CHECKING FORMULAS

After a number of formulas have been entered, it may be desirable to view them as originally entered, checking for mistakes and necessary alterations. The spreadsheet programs display the result rather than the original formula, but if the active cell contains a formula, the original entry will be shown in the status line. Thus, the various formulas can be viewed by moving the cursor to the appropriate cells. If the spreadsheet contains a large number of different formulas, as in the current example, it can be tedious having to move the cursor to each cell in order to see the original formula. SuperCalc includes the option of having the original formulas, rather than the results, displayed on the screen. Using the appropriate command, the spreadsheet can be *toggled* (switched back and forth) between displaying results and displaying formulas. All nonformula cells are unaffected. VisiCalc does not include this option but allows you to print out the spreadsheet with formulas rather than results. Figure 8 (pp. 28-29) shows columns A through C of the spreadsheet with formula-display mode invoked and columns B and C widened to 35 characters in order to show the entire formulas.

COPY AND REPLICATE

At this point, the columns for months 1 and 2 have been entered, but 10 columns still require formulas to be entered. Entering all of the formulas individually (as with column C) would take a great deal of time. Fortunately, the spreadsheet programs include two powerful commands that greatly aid in entering very similar information such as these formulas.

COPY

The COPY command allows the user to copy an entire row or column (or any other set of entries) to another location on the spreadsheet. If you specify a

range of cells such as C1:C40 and then the single cell indicating the start of the destination cells, D1, this command will cause cell C1 to be copied to cell D1, cell C2 to cell D2, all the way through to C40 being copied to D40. That is a very powerful command. In one step, we can copy column C to column D; then using COPY again, we can copy columns C and D to columns E and F, and so on. However, the formulas in column C refer to other column-C cells; what happens when such formulas are copied to another column?

The spreadsheet programs provide three options at this point, making the command suitable for any situation. The first option keeps all the copied formulas exactly the same. That will not work for our situation, since we want formulas to reflect the column in which they reside.

The second option causes all formulas to be translated relative to their new location. Thus, SUM(C20:C23) would be translated automatically to SUM(D20:D23) if column C were copied to column D. Such an automatically universal (*global*) translation of the formulas normally is the desired option.

The third option causes the program to question the user, who must answer Y or N concerning each cell name in each formula being copied, that is, whether or not the formula should be translated. This may seem to be the best option for our situation, since the formula in C35 has two variables that should not be altered, the B30:M30, as discussed above (p. 27). However, this option requires our making translation decisions for all formulas in column C, and since it is faster to edit one incorrectly translated formula than to answer Y or N for each formula, we will choose the second option (which is the default option) and have the program translate every formula.

When executed, the COPY command works very quickly. Moreover, the entire spreadsheet will have its formulas recalculated automatically after the COPY command has been executed. COPY operates in a one-to-one fashion; that is, it copies one cell to one cell. That is why we can copy column C only to one column, column D. We could now COPY columns C and D to columns E and F (maintaining the one-to-one correspondence of cells), but another command provides a better approach when dealing with multiple columns.

REPLICATE

The REPLICATE command operates in much the same manner as the COPY command, except that it handles one-to-many situations. That is, with one execution of the REPLICATE command we can take any row or column or any other set of cells and cause the program to place copies of those cells in several other locations. In our present example, with just one use of the command, a copy of column D could be placed into each column from E to M. REPLICATE provides the same three option choices as COPY, and so we will choose the global translation of formulas. Figure 9 (pp. 32-33) shows the results of the use of these commands in columns B through E.

We have filled in all the monthly columns; now we have to go back and make some changes. First of all, the two cell names in the formulas in row 35 (of columns D through M) need to be changed back to B30:M30. This procedure is facilitated by the REPLICATE command. We can simply REPLICATE cell C35 (which is correct) to cells D35 through M35, but with the *ask* option. We want to have the first and last variables in C35 translated, but the middle two should remain the same. Thus, in one step, all ten occurrences of the incorrect formula can be replaced with the correct one. As soon as that is done, the program will recalculate all the spreadsheet formulas.

ALTERING CELL CONTENTS

The values in rows 16 (Direct Mail), 18 (Mailing, Postg), 36 (# Units Sold), and 37 (Contract Work) will change as the year progresses. The COPY and REPLICATE commands simply copied the values in column C, but we will need to manually change these values to match our spreadsheet as it was shown in Figure 3.

How can you alter the contents of a cell after you have entered information into it? This aspect of the spreadsheet programs has been mentioned but not actually discussed. The simplest method of altering cell contents is to move the cursor to that cell, type in the new contents on the edit/entry line, and hit the return key. The original contents will be written over, and if it is a numerical value, all formulas depending on that cell will be recalculated.

But if a cell contains a fairly long entry, such as a label or a formula, and you wish to alter only one or two characters of the entry, it may be easier to use the EDIT command. This command allows you to edit an existing entry by deleting or adding characters. When the command is executed, the program places the requested cell contents on the edit/entry line as if you had typed it but had not yet hit the return key. At that point, you can edit the entry by moving the "normal" cursor back and forth on the edit line and overwriting, deleting, or inserting characters. When you have finished editing, hit the return key, and the edited entry will be put into the spreadsheet cell.

Finally, if you simply wish to blank out a cell, you can use the BLANK command. This returns a cell to its initial empty status.

RECALCULATION AND "WHAT IF?" QUESTIONS

A balance sheet like this one is, at best, a close estimate of what reality will hold (unless, of course, it was developed after the fact). Most often, a spreadsheet is developed to give some approximate figures to work with in planning the future. When dealing with such estimating, it is very useful to adjust the various initial values to see what effect the changes have on the end result. Spreadsheet programs are particularly well suited for such "What if?" situations.

AUTOMATIC RECALCULATION

When we were filling in the entries for column C, you may have wondered why the cell names from column B rather than the numerical values in those cells were placed into column C. Using the REPLICATE command, the values could easily have been repeated in column C as well as in the other columns. However, what if we later decided to alter the initial value in cell B13 for Equipment? In order for the alteration to be reflected in the other columns, the REPLICATE command would have to be used again, to repeat the new value. But when the other columns contain the cell names of the previous column (going from column M containing the cell name from column L back to column C containing the cell name from column B), C13, which contains a reference to B13, will automatically be updated. Then D13, which contains a reference to C13, will automatically be updated, and so on to cell M13.

This is a simple example of the automatic recalculation feature of the spreadsheet programs, but it illustrates the basis of the programs' ability to deal with "What if?" questions. If any of the initial values is altered, the program will recalculate all the formulas, if necessary, to reflect the change. Suppose the programmer only works for 120 hours instead of 176—what will be gained? And, taking into account the additional work she would have to do, is the cost savings worth the additional time spent programming? What if only 30 copies of the program are sold in the third month instead of 75—how will that affect net income? Questions like these can be asked over and over and the spreadsheet program will keep recalculating.

MANUAL RECALCULATION

We have seen that whenever the contents of a cell are altered, formulas depending on that cell are updated. In fact, whenever a numerical value is entered, the program takes time to check each formula to see whether it will be affected by that new entry. This is usually desirable, but if the spreadsheet has a large number of formulas, the recalculation may take several seconds. Spreadsheet programs often have type-ahead capability, that is, you can keep typing while the program is performing the calculations and it will keep track of what you have typed and will catch up with you when it has finished the calculations.

But it may give you an insecure feeling to be typing and not have the program respond immediately. If immediate recalculation is not necessary (as when entering several new values), you can set the spreadsheet program to *manual recalculation* mode. When in this mode, no recalculation of formulas is done unless you enter the manual recalculation command (an ! in VisiCalc and SuperCalc). This command causes the program to recalculate all formulas with the current cell values.

The manual recalculation command has another use as well. When a program is recalculating formulas,

it looks at the cells in a particular order. The default order may be row-by-row (as with SuperCalc)—it looks at all formulas in row 1 and then all in row 2, and so on; or the default order may be column-by-column (as with VisiCalc). These are as good as any other orders, but the results may not always be as expected. For instance, column-by-column order will not work for the spreadsheet we have been creating. The formula in cell B35 depends on the total expenses of the year in order to calculate SUM(B20:M20). However, if column-by-column ordering is the default and then the Equipment cost in cell B13 is changed, all the formulas in column B will be recalculated before any of the other columns are examined. Therefore, when the formula in cell B35 is recalculated, it will still incorrectly use the old values in cells C20 through M20.

In such situations, where you have formulas dependent on other formulas, you must use the manual recalculation command in order to insure complete recalculation. Using the command two or three times in succession to insure complete recalculation for a complicated spreadsheet may be necessary. With a default of row-by-row ordering in the above example, all of the individual expenses will be updated, then the totals in row 30, and after that the formulas in row 35. Thus, no use of the manual recalculation command is necessary. The recalculation ordering needed to provide full automatic recalculation depends on the application.

OPTIONAL ORDERING

Finally, with respect to the order of recalculation, there is an option here also. You can choose that the order of recalculation be the opposite of the default. In all cases, if there is any doubt as to whether complete recalculation has been performed, use the manual recalculation command.

5. SAVING, PRINTING, AND RELOADING THE SPREADSHEET

ENDING A SESSION AT THE COMPUTER

STORING

The entry of the spreadsheet has been completed and “What if?” questions have been asked; now we are ready to exit from the spreadsheet program. Before exiting, we want to do some house-cleaning. This primarily consists of saving what has been entered. Using the STORAGE or SAVE command, we can place a copy of the spreadsheet on a diskette. Doing this is fairly straightforward. There are usually only a couple of options to keep in mind. The first is whether we want to save the spreadsheet as entered, including formulas, or just the values. *Values* means that only the results of formulas are saved (note that only the formula entries are affected). The second common option is whether all of the spreadsheet rows and columns should be saved, or only some of them. Usually, the entire spreadsheet, as entered, is saved. The SAVE command expects the name of a file and, if that file already exists, will ask if it should be backed up (that is, whether both the old and the new version should be saved), written over (that is, whether only the new version should be saved), or renamed (that is, whether the old file should be given a new name and the new one be kept under the old name). After receiving a response, the new spreadsheet will then be saved.

One other point of concern is more crucial with some programs than it is with others. Before saving a spreadsheet, and, preferably, even before starting work on one, you should make sure that on the diskette currently being used there is enough room to save the spreadsheet. Depending on the computer and the storage space on the diskette, you may have to be especially careful when working with a large spreadsheet. Both VisiCalc and SuperCalc spreadsheet programs will tell you when there is a problem and allow you to change the diskette or delete an existing file. However, a few programs cannot recover from an out-of-space error, and the spreadsheet currently being worked on will be lost. In any case, it is a good idea to keep tabs on the amount of storage space remaining on your diskettes.

In any of the programs, saving a spreadsheet is not very difficult. The important thing is to remember to do it! When you exit from the spreadsheet program, any information typed into the memory of the computer is lost and will have to be retyped. To be safe, try saving a spreadsheet a couple of times before working on anything really important. This will give you valuable experience and confidence.

A couple of comments should be made concerning backing up diskettes. All computers have the ability to copy files from one diskette to another (even if there is only one disk-drive). The computer you use may seem fairly reliable, but you never know when something will go wrong with it: the power may fail

while you are using an important diskette or a diskette may become warped. You should develop a regular procedure for making copies of your data diskettes, especially after entering a large amount of new information. If that diskette did happen to be ruined, you would otherwise have to reenter all of the information. A regular back-up procedure can save a considerable amount of retyping.

PRINTING

After saving your file but before exiting from the program, you may want to print a copy of your spreadsheet. You can print some or all of it, you can choose different formats for the print-out, and the print-out command can send the data to a printer or to a file. The maximum size of the output to be sent to a printer depends on the printer being used and is not affected by the size of the display window, as has been demonstrated by the size of the outputs in the previous Figures. The usual available formats for a print-out are: (1) the information appears just as it did in the spreadsheet, with marked rows and columns; (2) similar to (1), except that the rows and columns are not marked (so the output looks more like a report); and (3) the actual cell contents (e.g., formulas) are listed one per line. In each case, the output may be sent to a file or to the video display as well as to a printer. When sent to a file, the output may be used by other programs as input for processing or reporting. Most programs also have set-up options, which allow you to tailor your output for your model of printer. Since most of the spreadsheet programs are available for several different computers, it is important to have this flexibility when printing.

EXITING

Now we are ready to exit from the program. When performing a critical command such as exiting, you are given a second chance. That is, after entering the command to exit, the program asks you if you really want to exit. If you hit any key except Y for yes, the command will be aborted. If you reply Y, to confirm it, then you will be returned to the computer's operating system. Exiting clears the spreadsheet from memory —*never exit until you have saved the spreadsheet.*

RESTARTING A SESSION AT THE COMPUTER

At this point we have already worked on a spreadsheet, saved it, and exited from the spreadsheet program. Now we want to access that saved spreadsheet. We begin by starting the program as usual. (Note that no comment has been made concerning starting or executing spreadsheet programs. Execution of programs is somewhat computer-dependent, and therefore instruction is best derived from the computer manual.) Upon start-up, the program always provides you with a blank spreadsheet. Using the LOAD command, a saved spreadsheet may be accessed. The same options exist as for saving (discussed above). When the spreadsheet has been loaded, we can proceed as though we had never exited from the program.

6. OTHER COMMANDS

JUMPING DIRECTLY TO A SPECIFIED CELL

We have mentioned the use of the arrow keys and the control key to move the cursor and window to adjacent locations. However, it takes several seconds to get from one end of a large spreadsheet to the other (for instance, moving the cursor from cell A1 to cell M40 in the example above).

To facilitate moving from one cell to another, the spreadsheet programs provide a GOTO command, which causes the cursor to jump immediately to the specified cell. No matter where the cursor is positioned, it can be jumped to any cell by executing the GOTO command (typing a > in VisiCalc or a = in SuperCalc) and then supplying the column letter(s) and row number for the desired cell. If that cell is currently showing in the window, the cursor will simply jump to it; if the cell is not visible in the window, the window will be moved to the appropriate portion of the spreadsheet and the desired cell will appear in the upper lefthand corner.

PROTECTING CELLS FROM UNINTENTIONAL ALTERATION

SuperCalc has a useful pair of commands known as PROTECT and UNPROTECT. With the PROTECT command you can mark a cell or set of cells as protected from alteration by the user. For each cell marked in this way, the note PROTECTED ENTRY will appear on the status line when it is the active cell and, if your computer or terminal has variable brightness, it will be given a half-bright appearance to make it more readily distinguishable.

A protected entry cannot be altered by the user, but if it contains a formula, recalculation will cause the displayed result to change appropriately. It is the original contents in memory that are protected; the information on the display may be manipulated as usual. Protecting titles, fixed numerical values, and fixed formulas can prevent you from accidentally destroying important information. Remember, however, that the QUIT command will still exit from the program and clear the spreadsheet from the computer memory. When you want to alter a protected cell, you must unprotect it using the UNPROTECT command. The note PROTECTED ENTRY will disappear from the status line and the cell's brightness will return to normal.

MOVING AN ENTIRE ROW OR COLUMN

Often when working with tables of values, you will need to include an additional row of information or feel that the ordering of the columns should be changed. The spreadsheet programs provide three

commands suitable for such situations. The MOVE, INSERT, and DELETE commands each operate on an entire row or an entire column of the spreadsheet.

INSERT

The INSERT command allows you to insert a row or column (initially blank, or empty) into the middle of the spreadsheet. Suppose after the expense items had been entered into the sample spreadsheet, it was decided that in order to improve the spreadsheet's readability, blank rows should be inserted after each expense category. This could easily be accomplished with the INSERT command. For example, inserting a blank row between rows 12 and 13 would cause the spreadsheet program to automatically shift row 13 through the last row down one row, providing a new, blank row 13.

More important than being able to insert the rows, however, is the fact that the INSERT command automatically alters the formulas in the spreadsheet to reflect the new locations of any cells referred to in those formulas. For example, prior to the insertion of the new row, the Total Expenses entries were in row 30; after the insertion, they are in row 31. The original formula read "B12 + B13 + B17 + B18 + B24 + B29*B36," but now all those cells except for B12 have been moved down one row. The program realizes that fact and automatically alters the formula to read "B12 + B14 + B18 + B19 + B25 + B30*B37." Similarly, all other formulas depending on repositioned cells will be altered appropriately. (Figure 10, pp. 40-41, shows columns A through D after such an insertion.)

DELETE

We could now use the DELETE command to delete the row that was inserted above; it would also change all formulas back to their original contents. When deleting a nonblank line, one precaution must be kept in mind. If any cell in a row (or column) to be deleted is referred to by a formula elsewhere, that formula will cause ERROR to be displayed when the referenced row (or column) is deleted. The program was accessing the value in that cell, and it will not automatically take the value from the row (or column) that replaced the deleted one. In order to correct the situation, the formula must be reentered.

MOVE

The MOVE command works like a combination of the INSERT and DELETE commands. It will allow a row or column to be deleted from one location and inserted at a new location. As with DELETE and INSERT, the program will automatically translate any moved formulas to reflect their new locations. Unlike DELETE, if a formula accesses one of the cells in the moved row or column, the formula will be changed to reflect the new location of the referenced cell.

MANIPULATING THE SCREEN

TITLE

In the Super Software House example, the number of rows and columns is too large for the entire spreadsheet to appear in the window at one time. We can scroll back and forth or up and down, so there is no problem in accessing the columns or rows. But when we have, say, columns H through L in the window, the headings in column A are not visible. In such a situation it would be very easy to forget which row belonged to which item of information.

Using the **TITLE** command, we can prevent the scrolling of portions of the window. If we place the cursor at any row or column and execute this command, all rows above and including that row or all columns to the left and including that column will be fixed permanently in the window—locked as a title. Also, there is the option of fixing both the rows and the columns. In our example, the cursor could be placed at cell A2 and the **TITLE** command could be used with the **B** or **BOTH** option to fix both column A and rows 1 and 2. In this way, we would have both the item headings (in column A) and the month headings (in row 2) always visible in the window.

Another option of the **TITLE** command removes or “unfixes” the titles so that the window scrolls normally. Unless unfixed, titles stay locked even when the spreadsheet is saved and reloaded.

WINDOW

When accessing a large worksheet, we may wish to compare the information in sets of columns or rows that will not all fit in the window simultaneously. For instance, in the present example, if we wanted to look at the sales and income for the first six months (columns B through G) to compare them with the same values for the last six months (columns H through M), we would have to scroll back and forth continually.

The **WINDOW** command allows you to set up two simultaneous windows within the standard window area. Setting the cursor at the point of the break (as in the **TITLE** command) and executing the command causes two partial windows to appear, each with all the features of the normal window except that they are smaller.

Each window may be scrolled or altered in format. Thus, in one window, we could scroll months 1 through 6 and in the other we could scroll months 7 through 12. Any actual value change will be reflected in both windows, so updates can also be made while in this mode. One option of the command gives upper and lower windows (for rows) and one gives left and right (for columns).

To return to the single window simply requires the use of a third option of the **WINDOW** command.

HELP!

When using a spreadsheet program, it is often necessary to refer to the manual for information on commands, options to commands, or syntax. Some spreadsheet programs (including SuperCalc but not VisiCalc) have made this situation simpler by providing a built-in manual within the program itself. By executing the appropriate command, explanations and/or examples of other commands can be displayed, temporarily replacing the spreadsheet.

There are basically two approaches used to present this information. One approach provides a sort of help subsystem which reads much like a manual, allowing you to request the desired topic and read about it, then to request another. The other approach, that used by SuperCalc, is to provide only the information applicable to the user's current situation. That is, at any point when entering a command, an option to a command, or other information (except when in the middle of entering data), the user can type a question mark (?) and the program will give a short explanation of all of the legitimate entries at that point. In either case, the help features can save a beginning user a great deal of time.

IN CONCLUSION

Neither all of the available commands, nor all of the available options for those commands mentioned, have been included in this Handy Guide. For a full description, the manual for the program you choose should be consulted. Also, no attempt has been made to tell you which available spreadsheet program is best; all are good for various computers and specific applications. Rather, it is hoped that this Handy Guide has provided you with a working understanding if you are a new user, or a "What are they?" understanding if you are a potential user. Spreadsheet simulation programs are well-thought-out, quick-to-use, business-oriented programs that can fill a need for almost anyone. If you have a computer and work with numbers a great deal, they should be considered. If you do not have a computer but do work with numbers, then maybe such a program will be reason enough to purchase a computer for you, too.

APPENDIX A: A COMPARISON TABLE OF VISICALC AND SUPERCALC

The following table compares VisiCalc and SuperCalc. The table does not contain all of the features of either of the programs; instead it presents some of the most useful features of all the programs with a Y (yes) or N (no) to indicate if that feature is found in each program. The table offers a quick way of comparing these programs and also of seeing what features are commonly found in spreadsheet programs. For a complete and detailed listing of each program's features, the manual for that program should be consulted.

Feature	VisiCalc	SuperCalc
Calculator mode	N	N
Automatic recalculation	Y	Y
Cell format can be altered	Y	Y
Cell entries can extend into empty adjacent cells	N	Y
Data generated by another program can be used as input	Y	N
Help command	N	Y
Data manipulation commands		
Blank	Y	Y
Append (merge)	N	N
Copy	Y	Y
Replicate	Y	Y
Insert, delete, and move rows/columns	Y	Y
Page-scrolling	N	N
Title and window commands	Y	Y
Functions		
Absolute value	Y	Y
Automatic form mode	N	N
Average	Y	Y
Depreciation	Y	N
Greater/lesser	Y	N
Growth	Y	N
Lags/leads	Y	N
Min/max	Y	Y
Regression	N	N

Feature	VisiCalc	SuperCalc
Functions (continued)		
Slope	N	N
Net present value	Y	Y
Summation	Y	Y
Exponential (<i>e</i>)	Y	Y
Trigonometric (SIN, COS, TAN)	Y	Y
If (conditional)	Y	Y
Other formula operations		
Standard arithmetic (+, -, *, /, ^)	Y	Y
Boolean algebra (AND, OR, NOT)	Y	Y
Percentage (%)	Y	N
Graphics		
Partial	Y	Y
Color	Y	N
Recovers when:		
There is not enough disk space	Y	Y
There is a disk error	Y	Y
Structured file dump	N	N
Partial or full spreadsheet printout	Y	Y
Formulas can be listed by:		
Cell coordinates (e.g., A54)	Y	Y
Formula	Y	N
Display can be toggled to show all formulas	N	Y

APPENDIX B: A LIST OF SPREADSHEET SIMULATION PROGRAMS

The following list does not claim to be complete. It does, however, contain most of the presently available spreadsheet programs. Each program works on specific computers, but no attempt has been made to list those computers. The programs range in price from \$50.00 to \$2000.00. There are many choices, so take your time when considering the purchase of a spreadsheet program. And, by all means, sit down at a computer and try a program before buying it. That is the best way to determine whether it will be adequate for your application.

CalcStar	Micropro International 1299 4th St., San Rafael, CA 94901
ColorCalc	Intelligent Systems Corp. 225 Technology Park, Norcross, GA 30092
Desk Top/Plan II	VisiCorp 2895 Zanker Rd., San Jose, CA 95134
ExecuPlan	Vector Graphic 500 N. Ventu Park Rd. Thousand Oaks, CA 91320
FinPlan	Hayden Publishing 50 Essex St. Rochelle Park, NJ 07662
Forecast	Hayden Book Co. 50 Essex St. Rochelle Park, NJ 07662
Forethought	CompuWest 10801 National Blvd. Los Angeles, CA 90064
FPL	Lifeboat Associates 1651 3rd Ave. New York, NY 10028
Insight	Endo Porter 18001-L Skypark Circle Irvine, CA 92714
LogiCalc	Software Products Int'l 5482 Complex St., Suite 115 San Diego, CA 92123
Magic Worksheet	Structured Systems Group 5204 Claremont Oakland, CA 94618
Master Plan	Phase One Systems 7700 Edgewater Dr. Oakland, CA 94621
Master Planner	Comshare Target 1935 Cliff Valley Way Suite 200 Atlanta, GA 30329

MBA	Context Management 23864 Hawthorne Blvd. #101 Torrance, CA 90505
Micro DSS/Finance	Ferox Microsystems 1701 N. Fort Meyer Dr. Suite 611 Arlington, VA 22041
Micro Plan	Chang Labs 10228 N. Stelling Rd. Cupertino, CA 95014
Microfiness	Osborne McGraw-Hill 630 Bancroft Way Berkeley, CA 94710
Micromodeler	Act Ltd. 111 Hagley Rd. Edgbaston, Birmingham, England B168LB
Mini Model	Westico 25 Vanzant St. Norwalk, CT 06855
MultiPlan	Microsoft Corporation 10700 Northrup Way Bellevue, WA 98004
PLAN80	Lifeboat Associates 1651 3rd Ave. New York, NY 10028
Plan Master	Cromemco 280 Bernardo Ave. Mountain View, CA 94043
PlannerCalc	Comshare Target 1935 Cliff Valley Way, Suite 200 Atlanta, GA 30329
Planner Plus	Ohio Scientific 1333 So. Chillicothe Rd. Aurora, OH 44202
Profit Plan	Chang Labs 10228 N. Stelling Rd. Cupertino, CA 95014
Scratch Pad	Supersoft Associates P.O. Box 1628 Champaign, IL 61820
Spectaculator	Tandy/Radio Shack 1300 One Tandy Center Fort Worth, TX 76102
SuperCalc	Sorcim Corporation 405 Aldo Ave. Santa Clara, CA 95050
SuperComp-20	Access Technology 6 Pleasant St. So. Natick, MA 01760
T-Maker II	Lifeboat Associates 1651 3rd Ave. New York, NY 10028

Target	Advanced Mgm't Strategies Inc.
Target Planner	Comshare Target 1935 Cliff Valley Way Suite 200 Atlanta, GA 30329
UltraCalc	Eagle Computer, Inc. 983 University Ave. Los Gatos, CA 95030
Universal Business Machine	Spectrum Software 142 Carlow Sunnyvale, CA 94087
VictorCalc	Victor Business Products 3900 North Rockwell St. Chicago, IL 60618
VisiCalc	VisiCorp 2895 Zanker Rd. San Jose, CA 95134
Wedge	Access Software Inc. 2381 Mariner Square Dr. Suite 180 Alameda, CA 94501
ZenCalc	Software Toolworks 14478 Glorietta Dr. Sherman Oaks, CA 91423

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